

## Notes on the Cephalopoda.

By

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### I. On the male of *Amphitretus pelagicus* Hoyle.

Prof. A. OKA obtained in Tateyama Bay, Sagami Sea, April 7th, 1910, a jellyfish-like octopod which I identify as *Amphitretus pelagicus* Hoyle<sup>1)</sup>. So far as I know, it is the second specimen of the species captured in the region, the first being the one which was described by IJIMA and IKEDA<sup>2)</sup>. Moreover, it is of special interest as being the first specimen ever obtained, which can be determined as the male of that rare species. According to the statement of the collector, the specimen in question was discovered among the rocks near the shore after a storm. It is preserved in an excellent state. For placing this valuable specimen at my disposal, I wish here to express my grateful thanks to Professor OKA.

Aside of the characters in relation to the difference in sex, the specimen is not without some noteworthy differences from the female described by IJIMA and IKEDA. But this may be due in part simply to the difference in the state of preservation and in part to variations of secondary importance. (In making comparisons, the female described by IJIMA and IKEDA shall be referred to as the Misaki specimen).

In the first place, the body is somewhat laterally compressed, not nearly dorso-ventrally as in the Misaki specimen. The gelatinous coating is much thinner than in that specimen, measuring at most 6 mm., instead of 20 mm., in thickness at the posterior body-end. The umbrella is equally developed all around: unlike the Misaki specimen, the part of it between the ventral arms is as broadly developed as at any other interbrachial space.

In spite of the fact that the arms, except the left second and the hecto-

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1) Chall. Rep. XVI, pp. 67-68; pl. ix, figs. 7-9.

2) Annot. Zool. Jap., IV, 1902, pp. 87-101; pl. ii; 3 text-figs.

cotylyzed right third, are more or less damaged at the tip, it may safely be said that all are subequal or nearly equal. The arm length, as measured on the completely preserved left second arm, is 85 mm., which is about twice the length of the head and body taken together. The suckers on the same arm number thirty-two in all. Their disposition and relative size will best

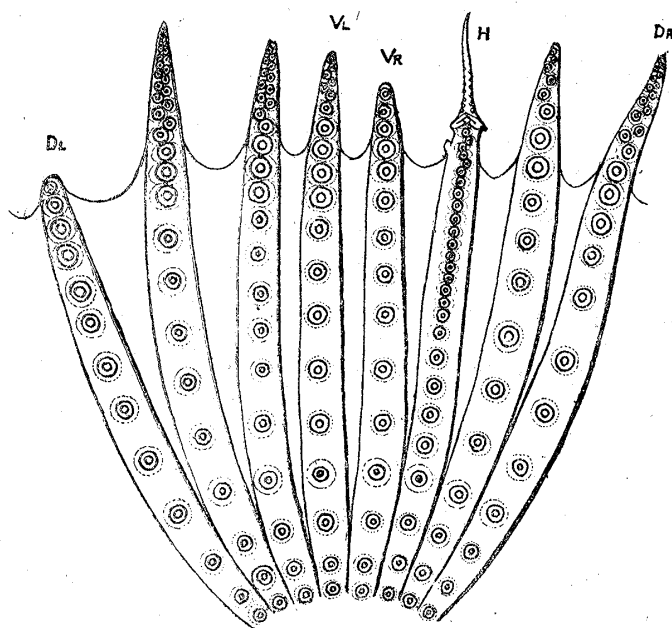


Fig. 1. Inner aspect of the arms, about natural size.  
DL, left dorsal ; DR, right dorsal ; VL, left ventral;  
VR, right ventral ; H, hectocotylyzed arm.

be seen from the annexed figure. In these respects there exists some slight deviation from the Misaki specimen.

The hectocotylyzed right third arm presents strikingly peculiar features. It is a little shorter than the left second arm, measuring 75 mm. long. Its tip, for a length of 14 mm., is remarkably slender, gradually tapering, finely pointed at the ex-

treme end and of a somewhat firm consistency. The flattened inner surface of the tip shows a series of minute rounded protuberances along each of its lateral margins. The tip is rather abruptly set off from the remaining parts of the arm by the presence, at the junction on the inner surface, of an angular shaped swelling, of which the angle is pointed distad and the two ends project on the sides of the arm. The swelling is traversed by a well defined narrow and deep groove of a similar shape and disposition, so that it may be said to consist of a distal and a proximal lip-like ridge, passing into each other at the sides. The proximal ridge exhibits in the middle a small rounded protuberance. Directly proximal to the above swelling and

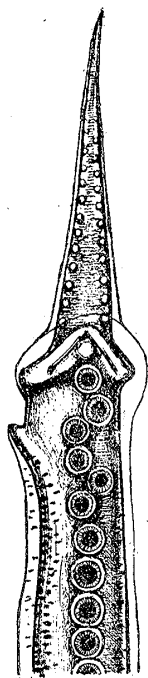


Fig. 2.  
Terminal part  
of the hecto-  
cotyliized arm,  
 $\times \frac{3}{8}$ .

unilaterally on the ventral side of the arm, there exists an indentation, which is proximally bounded by a firm prominence of the arm on the side referred to. Suckers occur on the arm in a series from the base to the angular shaped swelling. They are smaller, more numerous and more closely set than in other arms. Numbering twenty-seven in all, the fourth and the fifth suckers are the largest. For other points in the manner of their arrangement, the reader is referred to the figures.

Of the internal anatomy I can give only such scanty notes as could be taken by making incisions without much impairing the specimen. The liver presents the notable feature that its posterior parts project caudad and ventrad into the median mantle connective, which serves as a delicate sheath to those parts of the organ. The posterior end of liver is of the form of a rounded cone. From the apex of this emerges the ink-duct, which then proceeds straight to the anus. The penis has a striking resemblance to that of *Polypus*. It is of a retort-like shape, about 9 mm. long and situated on the left side of the visceral sac, the elongate part being directed cephalad. Needham's sac joins the penis at the neck-like part of the diverticle by means of a narrow passage.

The measurements of the specimen are as follows :

Total length.....	135 mm.
Breadth of body .....	40 "
Depth of body .....	45 "
End of body to mantle margin .....	45 "
End of body to the middle point between eyes .....	50 "
End of body to mouth.....	60 "
End of body to funnel extremity .....	72 "
End of body to umbrella edge between ventral arms .....	95 "
End of body to umbrella edge between dorsal arms .....	95 "

- Length of right second arm measured up from mouth.....85 mm.  
 Greatest thickness of arms .....10 „  
 Diameter of largest sucker ..... 2.3 „

As regards the affinity of the genus, Hoyle has assumed that it stands closest to *Cirroteuthis*, as agreeing with that genus in having the suckers arranged in single series and the arms united by a broad umbrella. It seems to me exceedingly doubtful if this view can be held up when the following facts are taken into consideration: Firstly, *Amphitretus* is entirely devoid of the dorsal cartilage, fins and brachial cirri, all which *Cirroteuthis* is in possession of. Secondly, *Amphitretus* has a pair of oviducts, while in *Cirroteuthis* and its allies that duct is always unpaired, — a difference which, in my view, goes far in indicating a rather remote relationship between the two genera. (IJIMA and IKEDA's statement that in *A. pelagicus* the oviduct occurs in a pair, I have confirmed by personally examining the original specimen described by them. I have found that the oviducts are in character essentially of the same type as those of *Polypus*. The oviduct proper and the vaginal part are both of a moderate length, connected together by a roundish oviducal ball. The vaginal part is thicker than the oviduct proper, and terminates at a point far posterior to the anus).

Rather it seems to me that *Amphitretus* is more nearly related to the Polypidae than to *Cirroteuthis*. This is indicated especially by the general agreement in the arrangement of internal genital organs.

It was pointed out by IJIMA and IKEDA that *Amphitretus* approaches *Alleposus* in several respects. This is indeed true to a degree, but the structure of the hectocotylus seems to point to the former being nearer to the Polypidae than the latter.

## II. Diagnoses of Four New Species of Polypus.

### *Polypus ovulum* sp. nov.

? *Octopus areolatus*, Hoyle 1886, Chall. Rep. p. 86, pl. pl. iii, figs. 6, 7.

? *Octopus ocellatus*, Applöf 1886, Jap. Cephal. p. 8. pl. i, figs. 1-3.

Adult small, nearly 150 mm. in total length and 40 mm. in mantle-

length ; skin firm, shagreen-like, being thickly covered with uniform warts. Body oblong ; sides with neither tubercles nor ridges. Umbrella of a moderate breadth, distinctly narrower between dorsal than between ventral arms. Funnel organ deeply W-shaped.

Arms slender, subequal ; dorsal pair the shortest. Right third arm weakly hectocotylized, only a little shorter than the corresponding arm of the opposite side ; apical organ  $\frac{1}{15}$  the entire length ; suckers in the normal part in 55-70 transverse series.

Frequently a few broad and dark longitudinal stripes on the back of head and body, but no brick-colored patch either on head or on mantle. In front of and below each eye, there is found a conspicuous black round patch containing a small shining cobaltic or violet ring which never exceeds 4 mm. in diameter. The patch lies nearer to umbrella margin than to eye.

Branchial leaflets number 15-17 in each gill.

General shape of vas deferens in situ hemispherical and cup-like, covering over antero-lateral parts of testis; Needham's sac long, encircling the vas deferens and testis meridionally ; spermiduct moderately long. Penis slender, conspicuous, bent into V-shape, forming a swollen, elliptical and well marked diverticle at the anterior extremity of the inner lobe ; Needham's sac connected to the diverticle. Spermatophore 49-61 mm. long ; its spermatic part 23-27 mm. long, containing 230-270 coils of sperm cord.

Vagina thin, with a marked S-like curve in the middle of its course, terminating a short distance posterior to anus ; oviducal ball situated on the dorsal side of ovary. Ovarial ova very small, attaining only 2-3 mm. in length, even when ripe. The specific name *ovulum* refers to the small size of ova.

Numerous specimens of the species purchased in the Tokyo market are preserved in the Sci. Coll. Tokyo.

***Polypus parvus* sp. nov.**

Adult very small, only a little over 100 mm. in total length ; skin firm,

finely wrinkled, evenly and uniformly warty. Umbrella poorly developed, extending for about  $\frac{1}{5}$  the length of arms. Funnel organ composed of a thin, W-shaped cushion.

Arms subequal; second pair the longest by a little. Suckers thickly set in double series, except the three at base which are uniserial.

Branchial leaflets number 9 or 10 in each gill. Vagina thick, short, nearly straight, terminating far posterior to anus. Ink-duct runs straight to anus; visible in its entire extent from outside the visceral sac. Spermatophore very small, about 12 mm. long; its spermatic part 5 mm. long, containing about 65 coils of sperm cord.

One male and female obtained from Prov. Satsuma. They are preserved in the Agric. Coll. of Sapporo.

***Polypus longispadiceus* sp. nov.**

Adult male attains about 300 mm. in total length. Dorsal surface of body, head, and bases of arms covered with single-headed roundish warts of somewhat various sizes, found in thickest distribution and best development above eyes; one of the supraorbital warts on each side is a little larger than the others. Umbrella broad, generally extending about  $\frac{1}{5}$  up the length of arms and thereafter continued as narrow contractile membrane along the ventral outer edge of each arm to the subterminal parts.

Arms slender, formula:  $1 > 2 \div 3 \div 4$ ; the longest 5-6 times the mantle-length. Suckers biserial, except the three at base which are uniserial; those of 2 or 3 transverse series near umbrella margin conspicuously enlarged. Right third arm, though prominently hectocotylized, about equally long as the left third; suckers on the normal part in 49-60 transverse rows; the hectocotylized part slender,  $\frac{1}{10}$  the entire length of the arm, of the same structural type as that of *Polypus hongkongensis* (Hoyle).

Funnel organ thickly W-shaped. Branchial leaflets count 20-23 in each gill. Coecal appendage of stomach reniform. First part of ink-duct hidden in liver.

Penis slender, slightly tapering caudad, mostly curved in a C-like and rarely in a 6-like manner; Needham's sac joins it near the anterior end. General shape of vas deferens in situ oblong, flattened a little, with the long axis transversely directed; Needham's sac running over and obliquely across spermatophoric and accessory glands; when full of spermatophores the sac is greatly enlarged, acquiring an S-like shape; spermiduct comparatively short and thick. Spermatophore slender, 90-105 mm. long; its spermatic part 35-40 mm. long, containing 110-120 coils of sperm cord.

Four males obtained from Prov. Rikuzen in the Sci. Coll., Tokyo.

***Polypus conispadiceus* sp. nov.**

Adult large, attaining about 1 m. in total length; skin nearly smooth, possessing only a few warts around the head, and a single cirrus above each eye. Head about half as wide as body. Funnel organ composed of two V-shaped pads.

Arms thick, about thrice as long as head and body taken together, uniform but the ventral pair a little shorter than the rest. Suckers comparatively small, somewhat sparsely set in double alternate series, except the three at base which are almost uniserial.

Right third arm prominently hectocotyized, about  $\frac{1}{3}$  shorter than the left third; suckers in the normal part in 26-29 transverse series; the hectocotyized part conspicuous,  $\frac{1}{5}$  -  $\frac{1}{6}$  as long as the entire arm, typically conical, thick at base, with a deep but narrow longitudinal groove.

Branchial leaflets number 20-24 in each gill.

Penis straight, subfusiform, about 30 mm. long in the adult; Needham's sac joins it in front of the middle. Spermatophore 110-140 mm. long; its spermatic part 40-60 mm. long, containing 46-63 coils of sperm cord. Oviduct terminates at a point far posterior to anus; ripe ovarian ova 30 mm. long.

Numerous specimens purchased in the Sapporo market and preserved in the Agric. Coll., Sapporo.